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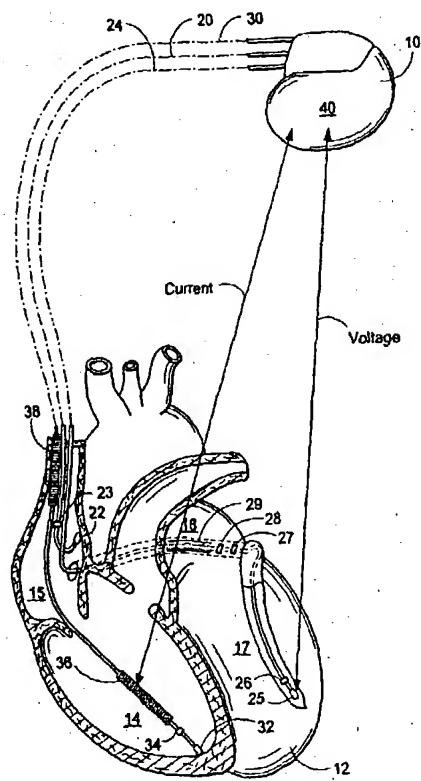
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(54) Title: CARDIAC STIMULATION DEVICES AND METHODS FOR MEASURING IMPEDANCES ASSOCIATED WITH  
THE LEFT SIDE OF THE HEART



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(57) Abstract: Methods of and systems for measuring at least one physiological parameter for assessing a patient's cardiac condition based on left heart impedance measurements are described. Various embodiments establish a current flow through a left side of the heart and measure a voltage between a first location on or in the left side of the heart and a second location within the human body while establishing the current flow. The inventive techniques and systems can be used for, among other things, measuring progression or regression of myocardial failure, dilation, or hypertrophy, pulmonary congestion, myocardial contractility, or ejection fraction. The measured voltage, related to left heart impedance, can be used to monitor patient condition for diagnostic purposes or to adapt pacing or defibrillation therapy. Therapy adaptation can include controlling pacing modes, pacing rates, or interchamber pacing delays, for example.



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**INTERNATIONAL SEARCH REPORT**

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**A. CLASSIFICATION OF SUBJECT MATTER**  
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**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 990 451 A (MEDTRONIC INC) 5 April 2000 (2000-04-05)  the whole document	1-7, 11-23, 29, 33-39, 58,66
X	WO 99 30777 A (ROOS CUBUS DE ;BAKELS ARNOLDUS (NL); LEINDERS ROBERT (NL); MEDTRONIC) 24 June 1999 (1999-06-24)  the whole document	1-7, 11-23, 29, 33-39, 58,66

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